Title: The cost-effectiveness of a COVID-19 vaccine in a Danish context

Authors: Kristian Debrabant[1], Lone Grønbæk[2], Christian Kronborg[3]

[1] Department of Mathematics and Computer Science, University of Southern Denmark, 5230

Odense M, Denmark

[2] Department of Economics, University of Southern Denmark, 5230 Odense M, Denmark

[3] Department of Business and Economics, University of Southern Denmark, 5230 Odense M,

Denmark

Corresponding author: Christian Kronborg, Department of Business and Economics, University of

Southern Denmark, Campusvej 55, 5230 Odense M, Denmark.

Tel: +45 65 50 30 85

e-mail: cka@sam.sdu.dk

Table A1 Further parameters

Parameter	Value i = 1 (< 60 years)	Value i = 2 (≥ 60 years)
pop_i (Total population	4300000	1500000
Proportion of intensive care patients needing respirator	0.80	
Diagnosed until August 26th	16724	
Tests until August 26th	2318485	
On intensive care until May 19th	91	243

Table A2 Calculation of production loss. Danish Kroner (DKK).

Age group	Duration of covid-19 disease, number of days (1)			Earning per hour worked, DKK (2)	Employment rate (3)	Working hours per day (4)	Production loss, DKK (5)
	Mean	Min	Max				
0-19	6.0	4	8	173.85	0.28	6.7	1957
20-39	10.0	2	21	287.08	0.74	6.68	14101
40-59	14.8	1	51	339.38	0.82	6.68	27526
60-79	25.8	2	67	341.27	0.30	6.68	17731
80+	27.4	13	36	341.27	0		0

Notes:

1 Statens Serum Institu. Covid-19 i Danmark. Epidemiologisk trend og fokus: Symptomer. 25. maj 2020. https://files.ssi.dk/COVID19-epi-trendogfokus-25052020-us12

2 Statistics Denmark. StatBank Denmark. Earnings per hour worked by components, industry (DB07), sex age and time. Table LONS60.

3 Own calculations based on Statistics Denmark. StatBank Denmark. FOLK1B: Population at the first day of the quarter by citizenship, sex, region, age and time. https://www.statistikbanken.dk/statbank5a/default.asp?w=1440 and Statistics Denmark. StatBank Denmark. RAS300: Employed (end November) by industry (DB07), socioeconomic status, age and sex. https://www.statistikbanken.dk/statbank5a/default.asp?w=1440 .

4 Calculated on the basis of statistics of weekly hours of work. Eurostat, Average number of usual weekly hours of work in main job, by sex, professional status, full-time/part-time and economic activity (from 2008 onwards, NACE Rev. 2) - hours . https://ec.europa.eu/eurostat/databrowser/view/lfsa_ewhun2/default/table?lang=en assuming five working days per week.

5 Production loss = Mean duration x Earnings pr hour x Employment rate x Working hour per day

Figure A1 Initial values as used in [. SSI expert group, COVID-19 DK. https://github.com/laecdtu/C19DK , 2020]. Here, *Ntot = pop₁ + pop₂,* and * denotes component-wise multiplications. We correct the portion of susceptible and infected individuals according to the vaccination strategy.

$$H^R(t_0) = (11,8)^\top/Ntot.*(1 - Vac(t_0)./pop)$$

$$S(t_0) = (pop - I0.*(1 - Vac(t_0)./pop))/Ntot - H^R(t_0) - Vac(t_0)/Ntot$$

$$H^C(t_0) = (0,0)^\top$$

$$C^R(t_0) = (0,0)^\top$$

$$C^D(t_0) = (0,0)^\top$$

$$R(t_0) = (0,0)^\top$$

$$D(t_0) = (0,0)^\top$$

$$U(t_0) = 11.3.2020$$

$$HCum(t_0) = (29,30)^\top/Ntot$$

$$CCum(t_0) = (0,3)^\top/Ntot$$

$$E^1(t_0) = (10,19)^\top/24.*I0.*(1 - Vac(t_0)./pop)/Ntot$$

$$E^2(t_0) = (9,1)^\top/24.*I0.*(1 - Vac(t_0)./pop)/Ntot$$

$$E^3(t_0) = (0,0)^\top/24.*I0.*(1 - Vac(t_0)./pop)/Ntot$$

$$I^{R,1}(t_0) = (1,2)^\top/24.*I0.*(1 - Vac(t_0)./pop)/Ntot.*((1,1)^\top - p^{IH})$$

$$I^{H,1}(t_0) = (1,2)^\top/24.*I0.*(1 - Vac(t_0./pop))/Ntot.*p^{IH}$$

$$I^{R,2}(t_0) = (2,1)^\top/24.*I0.*(1 - Vac(t_0)./pop)/Ntot.*((1,1)^\top - p^{IH})$$

$$I^{H,2}(t_0) = (2,1)^\top/24.*I0.*(1 - Vac(t_0)./pop)/Ntot.*p^{IH}$$

$$I^{R,3}(t_0) = (2,1)^\top/24.*I0.*(1 - Vac(t_0)./pop)/Ntot.*((1,1)^\top - p^{IH})$$

$$I^{H,3}(t_0) = (2,1)^\top/24.*I0.*(1 - Vac(t_0)./pop)/Ntot.*p^{IH}$$